UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/539,875 | 03/24/2006 | Corinne Perret | 9905/29 | 6339 |

7590 07/24/2008

Brinks Hofer Gilson & Lione
PO Box 10395
Chicago, IL 60610

| EXAMINER | |
|---|---|
| ANGADI, MAKI A | |
| ART UNIT | PAPER NUMBER |
| 1792 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 07/24/2008 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/539,875 | PERRET ET AL. | |
| | Examiner | Art Unit | |
| | Maki A. Angadi | 1792 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *24 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 March 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/17/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-5 and 8-9 are rejected under 35 U.S.C. 103(a) over Chou (US Patent No. 5, 772,905).

*As to claim 1,* Chou discloses a lithography method (col.2, lines 19-21) that reads on the process of pressing of a substrate (18) (Fig.1A) wherein the substrate is covered with a layer (20) (col.4, lines 10-12) a pressing step in which a mold (10) comprising a pattern of recesses and protrusions (16) (Fig.1A) is pressed so as to penetrate part of the thickness of the layer (20) (Fig.1B) (col.4,

lines 13-19), etching using etching pattern defined by the mold pattern (Fig.1C)(col.4, lines 26-37), a step involving a curable material such as PMMA (20) spun on a silicon wafer (18) (col.4, lines 57-67), the pressing step including penetration of the protrusions of the mold(14) into the external sub-layer (20) until it comes into contact with protrusions contact the internal sub-layer ((20) (Fig.1C-D).

Chou does not expressly disclose the etching step in which the layer is attacked until part of the surface of the substrate have been exposed. One who is skilled in the art would expect the stripping or removal of the layer in the process of etching by either reactive ion etching or wet etching employed by Chou (col.4, lines 33-35).

*As to claim 2,* Chou discloses steps that read on the internal sub-level (20) being formed in contact with the surface substrate (18) during attacking/etching step, the internal sub-layer is removed through the recesses of the external sub-layer (14), during the substrate etching step, the substrate is etched through the same recesses (Fig.1B, col.4, lines 13-26).

*As to claim 3,* Chou discloses the method that the internal sub-layer (20) is made of a thermoplastic polymer (col.4, lines 50-51) and the external sub-layer is made of softened thin film (col.4, line 45). Chou does not expressly disclose that the internal sub-layer and the external sub-layer is the same material. One who is

skilled in the art should be able to select same material for both sub-layers that are soft using compressing molding of thermoplastic polymers suitable for nanoimprint lithography (col.1, lines 61-63).

*As to claim 4,* Chou discloses a method that includes the heat treatment (curing) at a temperature higher than the curing temperature and the pressing step at a pressing temperature higher than the glass transition temperature of the external sub-layer (col.4, lines 65-67, col.5, lines 1-8).

*As to claim 5,* Chou discloses that the curable material is a polymer (PMMA, polymethyl methacrylate)(col.4, lines 57-58).

*As to claim 8,* Chou discloses a method so that the internal sub-layer (20) (Fig.1A) has a thickness of about 50 nm to about 250 nm, which is slightly higher than the thickness claimed by the applicant. One who is skilled in the art at the time the invention should be able to adjust the film thickness to optimize conditions for lithography (col.3, lines 52-67).

*As to claim 9,* Chou discloses a method wherein the thickness of the external sub-layer (50-250 nm) (col.4, lines 57-59) and the depth of the pattern recesses (col.4. lines 43-45). One who is skilled in the art at the time the

invention was made to select these dimensions to optimize the conditions for lithography (col.3, lines 52-67).

***Claim Rejections - 35 USC § 103***

2. Claims 6 is rejected under 35 U.S.C. 103(a) over Chou (US Patent No. 5, 772,905) as applied to claim 1 above, in further view of Pavlinec *Journal of Polymer Science, Vol.55, (1995) pages 39-45.*

Chou does not expressly disclose that the polymer can be cross-linked. However, Pavlinec discloses that PMMA polymer can be cross-linked by chemical reactions (col.1, page 41, paragraph 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select polymer such as PMMA which can be cross-linked because Pavlinec illustrates that PMMA can be cross-linked by chemical reactions of linear macromolecules with multifunctional compounds (page 41).

***Claim Rejections - 35 USC § 103***

3. Claims 7 and 10 are rejected under 35 U.S.C. 103(a) over Chou (US Patent No. 5, 772,905) as applied to claim 1 above, in further view of Pavlinec *Journal of Polymer Science, Vol.55, (1995) pages 39-45* and Allen, *IBM Journal of Research and Technology, Vol.41, No.1/2, (1997) pages 95-102.*

Chou discloses the use of a PMMA forming a resist pattern (col.3, lines 34-37) but does not expressly disclose being a positive or a negative resist. However, Allen discloses that PMMA forms a positive resist pattern in lithography (page 98). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select PMMA in the lithography because Allen illustrates that PMMA forms a 193 nm resist pattern because of their excellent optical transparency (page 1997).

## ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tavkhelidze (US Patent No. 6, 680,214) discloses an artificial band gap.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maki A. Angadi whose telephone number is 571-272-8213. The examiner can normally be reached on 8 AM to 4.30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public

PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Maki A Angadi/
Examiner, Art Unit 1792

/Binh X Tran/
Primary Examiner, Art Unit 1792